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DEPARTMENT OF STATE

Washington, D.C. 20520

BUREAU OF INTERNATIONAL SCIENTIFIC
AND TECHNOLOGICAL AFFAIRS

U.S.-U.S.S.R. Programs Secretariat

STATINTL

STATINTL April 29, 1974

NOTE FOR: CIA - [redacted]

SUBJECT: Briefing 9:39 a.m., May 2, 1974

file

Following is a list of NSF personnel who have been invited by the U.S. Working Group Chairman on Microbiology to the briefing at 9:30 a.m., May 2, Room 924 of the Foundation, 1800 G Street, N.W.

Dr. Joshua Leise (U.S. W.G.C.)
Office of the Deputy Assistant
Director for Research

Dr. Eloise V. Clark
Head of the Molecular Biology Section

Dr. Edward C. Creutz
Assistant Director for Research

Dr. Jerome Fregeau
Executive Assistant to the Deputy Assistant
Director for Research

Dr. Marshall M. Lih
Division of Engineering

Dr. John Mehl
Deputy Division Director
Division of Biological and Medical Sciences

Dr. Richard Ries
Office of International Programs

Dr. John Thomas
Office of International Programs

Dr. Edward Todd
Deputy Assistant Director for Research

Microbiology

Dr. George Tsao
Program Manager for Advanced Technology
Applications

Dr. Israel Warshaw
Deputy Division Director
Division of Engineering

I have been informed by Dr. Leise's secretary that all the above have security clearance through Secret.

In addition to the above, Dr. Arthur Humphrey of the College of Engineering, University of Pennsylvania, and Co-Chairman of the U.S. Group, will also attend the briefing. Dr. Humphrey has received, for the day of the briefing, a Secret security clearance from the Department of State.

It is also possible that one or more of the following from this office may attend the briefing: Dr. Oswald H. Ganley, Dr. Royal Wald, All have appropriate security clearance. Miss Adah Sheldon

aws.

Adah Sheldon

11 Apr. 74

Approved

Retain

PLAN OF ACTION

IN FULFILLMENT OF THE WORKING PROGRAM FOR SCIENTIFIC AND TECHNICAL COOPERATION BETWEEN THE U.S.A. AND U.S.S.R. IN THE FIELD OF "PRODUCTION OF SUBSTANCES BY MICROBIAL MEANS" FOR THE PERIOD JANUARY 1, 1974 TO DECEMBER 31, 1974.

EVENT NO.	EVENT NAME	NUMBER OF PARTICIPANTS USSR	NUMBER OF PARTICIPANTS USA	DATE OF ACTION	PLACE	PERIOD OF ACTION	RESPONSIBLE ORGANIZATIONS USSR	RESPONSIBLE ORGANIZATIONS USA	REFERENCE BASIS
1	3rd Meeting Working Group	10	10	June 10 to June 20	Wash.,D.C.	2 weeks	Main Board	NSF & Dept.of State	Recommendation in Record of 2nd meeting
2	Conference on Instrumentation	5	5	Aug.1974	Phila., USA	2 weeks	Main Board & Kazan Inst.	NSF & U. of P.	Project Task 1.1
3	Conference on Mechanism of HC uptake by Microbes	5	5	Fall 1974	Moscow, USSR	2 weeks	Main Board & Inst. Prot. Synth.	NSF & Kansas State Univ.	Project Task 2.1
4	Exchange Visits on Computer Control	2	2	1974-75	Kazan MIT J. of P. Widener College	2 faculty for 3 months 2 post-doctorals for 1 year	Main Board	NSF	Project Task 4.1
5	Joint Book Writing	5	5	1974	Phila., USA in connection with event 2	2 weeks	Main Board	NSF	Project Task 6.1

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	Research Project on Fermentation Inst.	---	4	begin July 1,1974	U. of P.	3 years	Main Board	NSF	Project Task 1.2 & 1.3
	Research Project on Ferm.Dispersion	4	--	begin July 1,1974	Kazan Inst. of Chem. Tech.	3 years	Main Board	NSF	Project Task 1.4
	Research Project on Theory of HC Uptake by Microbes	10	4	begin July 1, 1974	Inst. Prot. Synth. & Kansas State Univ.	3 years	Main Board	NSF	Project Tasks 2.2 & 2.3, Tasks 3.1 & 3.2
	Research Project Development of Systems for Computer Control of Ferm. Systems	10	8	begin July 1, 1974	Kazan Inst. Chem.Tech. Univ. of Penna. Mass.Inst.Tech.	3 years	Main Board	NSF	Project Tasks 4.1 & 4.2

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EVENT NO.	EVENT NAME	NUMBER OF PARTICIPANTS USSR	USA	DATE OF ACTION	PLACE	PERIOD OF ACTION	RESPONSIBLE ORGANIZATIONS USSR	USA	REFERENCE BASIS
10	Polimery-74 Conference	6	6	Sept. 3-16 1974	Moscow	2 wks.	Main Board	NSF	Project 4, Task 6
11	Enzyme systems for acoustic imaging and holography	4	4	July 1, 1974	U. Pa. Moscow U.	5 yrs.	Main Board	NSF	Project 4, Task 4.2
12	Production of sugar from cellulose	6	6	July 1, 1974	Inst. Biosyn. Protein Sub.	U. Cal. Berkeley	Main Board	NSF	Project 4, Task 5.1
13	Fermentable sugars from agricultural solid waste	6	6	July 1, 1974	Inst. Biosyn Protein Sub.	Iowa State Univ.	Main Board	NSF	Project 4, Task 5.2
14	Cleavage reversal to produce peptides and fine chemicals	4	4	July 1, 1974	Inst. Biosyn. Protein Sub.	Corning Glass	Main Board	NSF	Project 4, Task 5.4
15	Laboratory & Field Visits	4-7	4-7	June 1974	Various Sites	3 wks.	Main Board	NSF	Project 5
16	Working Conference	4-7	4-7	July 1974	Beltsville, Md	3-5 days	Main Board	NSF	Project 5
17	Research Program	?	?	Begin Sept. 1974	Various Sites	2 yrs.	Main Board	NSF	Project 5
18	Exchange of Junior Scientists	4-7	4-7	Begin Sept. 1974	Various Sites	1 yr.	Main Board	NSF	Project 5
19	Meeting, exchange of cultures, & field trips	4-6	4-6	Dec. 1974	Wash.,D.C.	2 wks.	Main Board	NSF	Project 5

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20	Exchange of Publications	1	-	July 1, 1974	Cambridge & U.S.S.R.	Continuing		NSF & MIT	Project 1 Task 1
21	Conference Work-Shop on SCP Research	6	20	Sept. 1974	Cambridge, Mass. USA	3 Days	"	NSF & MIT	Project 1 Task 2A
22	Choice & Selection of Microorganisms	6	10	Sept. 1974	USA & USSR	1 Day	"	NSF & MIT	Project 1 Task 3
23	Research on Cultivation of Yeast and Bacteria on Various Substrates	-	6	Begin July 1, 1974	M.I.T., U. Pa., U. Missouri	2 Years		NSF	Project 1 Task 4.1 & 4.2
24	Research on Protein Isolation & Release		4	Begin July 1, 1974	M.I.T.	2 Years		NSF	Project 1 Task 5.1 & 5.2
25	Research & Development of Biomass Production	-	4	Begin July 1, 1974	M.I.T., U.Pa., U. Missouri	2 Years		NSF	Project 1 Task 4.2, 4.2, 4.3
26	Research & Development on Protein Isolation	-	4	Begin July 1, 1974	M.I.T.	2 Years		NSF	Project 1 Task 5.1 & 5.2
27	Research & Development on Industrial Methods of Biomass Production	-	4	Begin July 1, 1974	M.I.T.	2 Years	"	NSF	Project 1 Task 6.1, 6.2, 6.3
28	Biological Value and Toxicity		2	Begin July 1, 1974	M.I.T.	3 Years	"	NSF	Project 1 Task 8

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29.	Conference on genetics non antibiotic producing cultures	5	5	Spring 1975	Chicago or Seattle	2 days	Main Board	NSF	Project Task 1.0
30.	Conference on genetics antibiotic producing cultures	6	6	Spring 1975	Leningrad	3 days	Main Board	NSF	Project Task 1.2
31.	Research Projects on genetics of antibiotic producing cultures	3 institutions	3 institutions	1975	US and USSR	3 years	Main Board	NSF	Project Task 1.3
32.	Research projects on cellulose utilization	2	2	1975	US and USSR	2 years	Main Board	NSF & Natick Lab.	Project Task 1.4
33.	Annual Conference on research projects (1.3, 1.5)	12	12	Annual	Alternating US and USSR	3 days	Main Board	NSF	Project Tasks 1.3 & 1.5
34.	Research projects on genetics of non-antibiotic producing cultures	3	3	1975	to be determined	3 years	Main Board	NSF	Project 3 Task 1.5

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35.	Exchange of personnel in genetic research projects	6	6	1 from each country for 12 months	US & USSR	3 years	Main Board	NSF	Project 1 Task 1.6
36.	Conference on genetic engineering	5	5	Spring 1975	Stanford	4 days	Main Board	NSF	Project 1 Task 1.6
37.	Research projects in genetic engineering and molecular biology	3	3	Spring 1976	US & USSR	3 years	Main Board	NSF	Project 1 Task 1.7
38.	Workshop on insect control	5	20	Oct. 1974	East Lansing, Mich.	3 days	Main Board	NSF	Project 2 Task 2.1
39.	Conference on genetics of insect pathogens	8	5	Spring 1975	Armenia	3 days	Main Board	NSF	Project 2 Task 2.2
40.	Research projects on genetics of insect pathogens	3	3	Spring 1976	US & USSR	3 years	Main Board	NSF	Project 2 Task 2.3
41.	Research project on B. thuringiensis and B. popilliae	1	1	Spring 1975	Manhatan, Kans, & Armenia	1 year	Main Board	NSF	Project 3 Task 2.4

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42.	Conference on research projects (2.3)	4	4	Spring 1977 1978	US & USSR	2 days	Main Board	NSF	Project 3 Task 2.3
43.	Conference on mutagenesis and recombination	10	5	Spring 1975	Leningrad	4 days	Main Board	NSF	Project 3 Task 3.1
44.	Research project on	1	1	Spring 1975	Berkeley & Leningrad	3 years	Main Board	NSF	Project 3 Task 3.2
45.	Research project on genetic analysis	2	2	Fall 1974 & Spring 1975	Waltham, Mass. Leningrad & Moscow	3 years	Main Board	NSF	Project 3 Task 3.3
46.	Exchange of personnel in yeast genetics programs	3	3	1 from each country for 12 months	US & USSR	3 years	Main Board	NSF	Project 3 Task 3.2 & 3.3
47.	Conference on research projects	3	3	Annual	Alternating US & USSR	3 days	Main Board	NSF	Project 3 Task 3.2 & 3.3
48.	Research projects on amino acid production	2	1	Fall 1974	Chicago & Armenia	3 years	Main Board	NSF	Project 3 Task 4.1
49.	Research projects on genetic analysis in bacillus	2	2	Fall 1974	Waltham, Mass. Rochester, NY Moscow & Armenia	3 years	Main Board	NSF	Project 3 Task 4.2

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10.	Exchange of personnel (4.1 & 4.2)	3	3	1 from each country for 12 months	US & USSR	3 years	Main Board	NSF	Project 3 Task 4.1 & 4.2
11.	Conference on research projects (4.1 & 4.2)	3	3	Annual	Alternating US & USSR	3 days	Main Board	NSF	Project 3 Task 4.1 & 4.2
12.	Symposium on genetic methods to be published in book	20	20	1979	US or USSR	1 week	Main Board	NSF	Project 3 Task 4.3 (summary 4)

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WORKING PROGRAM Development of Technology for Industrial Production and Utilization of Food and Feed Proteins by Microbial Means, Including Research into Different Aspects of Toxicity and Biological Value of Such Products.

PROJECT NO. 1

PROJECT TITLE

PROJECT COORDINATOR Dr. Gregorian, U.S.S.R. and Dr. Daniel I.C. Wang, M.I.T., U.S.A

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
1	Exchange of Publications	Gregorian	D.I.C. Wang M.I.T.	July, 1974 and continuing	Exchange of Publications and Conference Reports	Establish and Continue Basis of Communication
2A	ARRANGE WORK-SHOP MEETINGS ON SINGLE-CELL PROTEIN RESEARCH (PART A) TOTAL: 20 U.S. PART. AND 6 U.S.S.R. PART DURATION: 3 DAYS					
	2.1 Biological Value and Toxicity		V. Young, M.I.T. N. Scrimshaw, M.I.T. B. Oser, F & D Res. Lab. D. Calloway, U. Cal	Fall, 1974	Meet in U.S.A.	Planning, Initiating, and Reporting on Cooperative Programs
	2.2 Selection of Microbe - Substrate Systems		D.I.C. Wang, M.I.T. C.L. Cooney, M.I.T. C. Dunlap, U. Missouri A. Laskin, Esso C. Wilke, U. Calif. J. Litchfield, Battelle E. Field, Std. Ind. A. Humphrey, U. of Pa. G. Tsao, N.S.F.	Fall, 1974	Meet in U.S.A.	"
	2.3 Single-Cell Protein For Food		S.R. Tannenbaum, M.I.T. C.C. McDonald, DuPont C. Atkins, Std. Ind. C. Rha, M.I.T. M. Milner, UN (PAG) T. Labuza, Univ. Minn.	Fall, 1974	Meet in U.S.A.	"
	2.4 Methods of Decreasing Nucleic Acid Content		A.J. Sinskey, M.I.T. S.R. Tannenbaum, M.I.T.	Fall, 1974	Meet in U.S.A.	"

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PROJECT NO. 1

PROJECT TITLE

PROJECT COORDINATOR Dr. Gregorian, U.S.S.R. and Dr. Daniel I.C. Wang, M.I.T., U.S.A.

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
2B	ARRANGE WORK-SHOP MEETINGS ON SINGLE-CELL PROTEIN RESEARCH (PART 2) TOTAL: 20 U.S.S.R. PART & 6 U.S. PART DURATION: 3 DAYS					
2.1	Biological Value and Toxicity		N.S. Scrimshaw, M.I.T.	Fall, 1975	Meet in U.S.S.R.	Planning, Initiating, and Reporting on Cooperative Program
2.2	Selection of Microbe-Substrate Systems		D.I.C. Wang, M.I.T. E. Field, Std. Ind.	Fall, 1975	Meet in U.S.S.R.	"
2.3	Single-Cell Protein for Food		C. Rha, M.I.T. M. Milner, UN (PAG)	Fall, 1975	Meet in U.S.S.R.	"
2.4	Methods for Decreasing Nucleic Acid Content		S.R. Tannenbaum, M.I.T.	Fall, 1975	Meet in U.S.S.R.	"

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PROJECT COORDINATOR Dr. Gregorian and Dr. Wang

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
		WORKING PROGRAM OF SIX PROBLEM TOPICS				
3	CHOICE AND SELECTION OF MICROORGANISMS					
3.1	Selection of Bacterial and Yeast Culture	-	R. Donovick , ATCC NRRL Cult. Coll. G. Silverman, U.S. Natick M.I.T. Univ. of Wis. L.S.U.	Fall, 1974 and Continuing	Microbial Culture Exchange	Establish and Broaden Existing Cultures
3.2	Regulation and Control Amino Acid Content of SCP		A.L. Demain, M.I.T. S.R. Tannenbaum, M.I.T.	Fall, 1974 1 Day and Continuing	Meet in U.S.A. Exchange of Existing Research Results	Review Past Progress and Establish New Techniques
4	RAW MATERIAL AND ECONOMIC ANALYSIS OF SCP PRODUCTION					
4.1	Cultivation of Yeast on Molasses, Ethanol, Methanol, Hydrocarbons, With Techno-Economic Analysis		D.I.C. Wang, M.I.T. (Hydrocarbons) C.L. Cooney, M.I.T. (Methanol) A.E. Humphrey U. of Pa. (Molasses)	Two Years (1974-1976) Two Years (1974-1976) Two Years (1974-76) (U. of Pa.)	Exchange of Reports	Forecast and Specify Economically feasible substrates for SCP Production
4.2	Cultivation of Bacteria on Methanol, Ethanol, Agricultural		C. Dunlap, U. Missouri (Cellulosics)	Two Years (1974-1976) U. of Missouri	Exchange of Reports	"
4.3	Comparison of Basic Variables & Choice of Substrate		M.I.T. U. of Pa. U. Missouri	One Week Fall, 1975	Conference to Discuss Progress, Analysis of Results From 4.1 & 4.2 at M.I.T. USA- 5 USA Part. 5 USSR Part.	Establish Status on Raw Material Best Suited With Optimistic Economic Potentials

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PROJECT COORDINATOR Dr. Gregorian and Dr. Wang, M.I.T.

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R. U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
5	DEVELOPMENT OF METHODS FOR PROTEIN ISOLATION FROM UNICELLULAR MICROORGANISMS				
5.1	Development of Enzymatic & Mechanical Methods of Protein Release	D.I.C. Wang, M.I.T. (Release)	Two Years (1974-1976)	Exchange of Research Report	Information Exchange to Establish Technical and Economic Feasibilities
5.2	Development of Techniques For Reduction of Nucleic Acids By Enzymatic & Physico-Chemical Means	A.J. Sinskey, M.I.T. S.R. Tannenbaum, M.I.T.	Two Years (1974-1976)	Exchange of Research	Information Exchange and Establish Technical and Economic Feasibilities
6	DEVELOPMENT OF INDUSTRIAL METHODS OF BIOMASS PRODUCTION				
6.1	Fermentor Apparatus Design & Scale-up	D.I.C. Wang, M.I.T.	Two Years (1974-1976)	Exchange of Reports	Establish Report on Fermentor Design Most Optimal for SCP Cultivation
6.2	Biomass Recovery	D.I.C. Wang, M.I.T.	Two Years (1974-1976)	Exchange of Reports	Define Process Parameters for Most Economical Means of Biomass Recovery
6.3	Purifying & Drying	T. Labuza, U. Minn.	Two Years (1974-1976)	Exchange of Reports	Establish & Process
6.4	Elaboration on Increased Capacity (Scale-up) For Biomass Purification and Production; Overall Process Evlauation; Economic Analysis	D.I.C. Wang, M.I.T. T. Labuza, U. Minn.	2 Months Fall, 1977	Work-shop with Specific Processes 5 US Part.; 5 USSR Part. Meet in USSR	Establish Techno-Economic Basis for Scale-up of Biomass Purification & Production

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PROJECT TITLE

PROJECT COORDINATOR Dr. Gregorian, U.S.S.R. and Dr. Daniel I.C. Wang, M.I.T.

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7	SPECIAL TREATMENT OF BIOMASS AND ISOLATED PROTEIN THEREFROM FOR USE IN PREPARATION OF FOODS					
7.1	Protein Isolation, Characterization of SCP		C. Rha, M.I.T.	Two Years (1975-1977)	Exchange of Research Reports	Definition of Protein Isolation & Characterization of Isolated SCP
7.2	Protein Utilization in Preparation of Foods		T. Labuza, U. Minn.	Two Years (1975-1977)	Exchange of Research Reports	Establish Protocol & Potential Routes of Prepared Foods From SCP
8	BIOLOGICAL VALUE AND TOXICITY					
		A.A. Pokrovsky Nutrition Institute	N.S. Scrimshaw, M.I.T.	Three Years (1974-1977)	Exchange of Reports	Establish Safety of SCP

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WORKING PROGRAM

Project No. 2

PROJECT TITLE: Engineering Research and Development of Equipment and Methods for the Computerized Simulation, Design and Control of Processes for Microbial Technology

PROJECT COORDINATORS: Dr. Shamil Yenikeyev, Kazan Institute Chemical Technology
Dr. Arthur Humphrey, University of Pennsylvania

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
1.	Development of techniques and new sensors for measuring the significant variables in microbial processes and assembling equipment for experimental investigations.					
1.1	Conference and position paper on needed instrumentation	Yenikeyev Kazan Inst. Chem. Tech.	Humphrey Univ. of Penna.	one week summer 1974	conference at Univ. of Penna. 5 USSR part. 5 US part.	position paper on needed instrumentation
1.2	Development of Instrumentation relative to measurement of biomass (including computer interface & software)	_____	Humphrey Univ. of Penna.	two years 1974-1976	exchange of research reports two man years	equipment development
1.3	Development of Instrumentation relative to measurement of microbial activity (including interface & software)	_____	Humphrey Univ. of Penna.	two years 1974-1976	exchange of research reports two man years	equipment development
1.4	Development of Instrumentation relative to measurement of system dispersion (including interface & software)	Yenikeyev Kazan Inst. Chem. Tech.	_____	two years 1974-1976	exchange of research reports	equipment & theory development

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PROJECT COORDINATORS: Dr. Shamil Yenikeyev, Kazan Institute Chemical Technology
Dr. Arthur Humphrey, University of Pennsylvania

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
2.	Investigation of momentum, heat, and mass transfer in heterogeneous gas-liquid-liquid type of culture condition					
2.1	Conference on mechanisms of hydrocarbon uptake by microorganism	? Inst. Protein Synth. USSR	Erickson Kansas State Univ.	one week fall 1974	conference at Inst. Prot. Synth. Moscow, USSR 5 USSR part. 5 US part.	Report on status & theory of HC uptake by microbes
2.2	Development of hydrodynamical theory for heterogeneous gas-liquid-liquid microbial culture	_____	Erickson Kansas State Univ.	two years 1974-1976	exchange of research reports	theory development
2.3	Development of experimental apparatus and taking of data for creation of a hydrodynamical model of the heterogeneous gas-liquid-liquid fermentation system	Yenikeyev Kazan Inst. Chem. Tech.	_____	two years 1974-1976	exchange of research results	equipment development

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3.	Research on microbial population dynamics of heterogeneous systems					
3.1	Development of a kinetic theory for behavior of microbes in a heterogeneous system	_____	Erickson Kansas State Univ.	two years 1974-1976	exchange of research reports	model development
3.2	Development of experimental apparatus and taking of data for creation of a model for microbial population behavior in a heterogeneous system	Yenikeyev Kazan Inst. Chem. Tech.	_____	two years 1974-1976	exchange of research reports	creation of a model for computer control appl.
3.3	Conference to integrate results of tasks 1, 2 and 3 and to assist in the design of the experimental demonstration unit (at Inst. Protein Synth.)	? Inst. Prot. Synthesis Yenikeyev Kazan Inst. Chem. Tech.	Humphrey Univ. of Penna. Erickson Kansas State Univ.	one month summer 1976	working conf. on equip. design	equipment design & specifications

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WORKING PROGRAM

Project No. 2

PROJECT TITLE: Engineering Research and Development of Equipment and Methods for the Computerized Simulation, Design and Control of Processes for Microbial Technology

PROJECT COORDINATORS: Dr. Shamil Yenikeyev, Kazan Institute Chemical Technology
Dr. Arthur Humphrey, University of Pennsylvania

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
4.	Development of Engineering techniques for optimal design of industrial scale fermentor and automatic control of industrial fermentation processes					
4.1	Exchange visits in order to coordinate the plans for the computer coupled fermentation control systems	Yenikeyev Kazan Inst. Chem. Tech.	Humphrey Univ. of Penna. Cooney-Mass. Inst. Tech. Jefferis Widener College	two men (each side) exchange visits one at post-doctoral level for one year, one at faculty level for three months	exchange visits	information exchange
4.2	Investigation on both the theoretical and practical aspects of computer control of fermentation systems	Yenikeyev Kazan Inst. Chem. Tech.	Cooney-Mass. Inst. Tech. Humphrey Univ. of Penna.	1974-1976 two men years M.I.T. one man year U. of P.	exchange of results and experience	knowledge in computer control systems plus software development

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WORKING PROGRAM

Project No.2

PROJECT TITLE: Engineering Research and Development of Equipment and Methods for the Computerized Simulation, Design and Control of Processes for Microbial Technology

PROJECT COORDINATORS: Dr. Shamil Yenikeyev, Kazan Institute Chemical Technology
Dr. Arthur Humphrey, University of Pennsylvania

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
4.3	Investigation of both the theoretical and practical aspects of computer control of fermentation systems	Yenikeyev-Kazan Inst. Chem.Tech.	Coony-M.I.T. Humphrey-U. of Penn.	1974-1976 two men years M.I.T. one man year U. of P.	exchange of results and experience	knowledge in computer control systems plus software development
5	Design and demonstration of practical system for computer control of fermentation system for the production of single cell protein from hydrocarbon substrates					
5.1	Conference to coordinate total design information	Yenikeyev-Kazan Inst. Chem.Tech. ? Inst.Protein Synth.	Humphrey-U. of P. Erickson-Kansas State U. Cooney-M.I.T. Jefferis-Widener Univ.	two weeks Fall 1976	conference with key people in attendance approx.5 from each side	specification of final design & trial runs
5.2	Design and Construction of the computer controlled fermentation unit	? Inst. Protein Synth.	----	one year 1976-1977	Consultation on design and construction	optimally designed practical computer controlled fermentor

WORKING PROGRAM

Project No.2

PROJECT TITLE: Engineering Research and Development of Equipment and Methods for the Computerized Simulation, Design and Control of Processes for Microbial Technology

PROJECT COORDINATORS: Dr. Shamil Yenikeyev, Kazan Institute Chemical Technology
Dr. Arthur Humphrey, University of Pennsylvania

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
5.3	Demonstration of optimal control of SCP fermentation through use of computer	? at appropriate site in USSR	----	Summer 1978	Consultations	optimal SCP process
6	JOINT WRITING AND PUBLISHING OF BOOK ON COMPUTER SIMULATION, DESIGN & CONTROL OF FERMENTATION SYSTEMS					
6.1	Meetings to plan & outline joint book	Yenikeyev-Kazan Inst.Chem. Tech.	Humphrey-U. of P.	Summer 1974 in connection with task 1.1	Planning of joint book	Book outline & chapter assignments
6.2	Writing of individual Chapters	Yenikeyev-Kazan Inst.Chem. Inst.	Humphrey-U. of P.	1974-1976	Exchange and criticism of Chapters	Book manuscript
6.3	Editing and Publishing of Book	Yenikeyev-Kazan Inst.Chem. Inst.	Humphrey - U. of P.	1976	Editing book in both Russian and English	Jointly Published Book

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WORKING PROGRAM

PROJECT NO. 3 PROJECT TITLE Genetics of Industrial Microorganisms

PROJECT COORDINATORS Dr. Halvorson and Dr. Brown, USA and Dr. S. Alikhanian, USSR

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
	Development of genetic methods for improving industrial microorganisms based on approaches of molecular biology.					
1.1	Conference to develop plans on genetics of non antibiotic producing cultures	S.I. Alikhanian Inst. genetics & selection of industrial microorganisms Moscow	H. Halvorson Brandeis U, Waltham, Mass.	1-2 days 1975 either with ASM or GSA annual meeting	Conference 5 USSR part. 5 USA part.	Design of research projects
1.2	Conference to develop plans on the genetics of antibiotic producing cultures	G.F. Gause Institute of New Antibiotics, Moscow I. Tereshin Institute of Antibiotics, Leningrad S. Navashin Institute of Antibiotics, Moscow	A. Demain, MIT D. Perlman, School of Pharmacy, U. of Wisconsin, Madison W.F. Brown, Squibb & Company G. Bradley Medical College of Virginia, Richmond	2-3 days 1975	Conference	Design of research projects
1.3						
1.4	Genetics of Antibiotic producing cultures	See 1.2	See 1.2	3 years 1975-8	Exchange of results and personnel. 3 man years USSR 3 man years USA	Increased production of antibiotics

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WORKING PROGRAM

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PROJECT COORDINATORS Dr. Halvorson and Dr. Brown, USA and Dr. S. Alikhanian, USSR

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
1. (Continued)						
1.4	Development of improved methods for cellulose utilization	L. Erokiid, ? Moscow	M. Mandels Natick, Mass	2 years 1975-6	Exchange of reports strains 2 man years USA 2 man years USSR at Post Doc. level	Improved enzyme production and fermentation technology
1.5	Genetics of non antibiotic producing cultures			2-3 years starting 1975-6	Specific research projects Exchange of information	Coordinating research. Increased yields
1.6	Conference on genetic engineering	V.N. Krylov Institute of Genetics & Selection of Industrial Microorganisms, Moscow	P. Berg Stanford	3-4 days 1975-6 Stanford	Conference 5 USSR in conjunction with an international meeting	Exchange of information & approaches
1.7	Use of genetic engineering and molecular biology for strain development	M.F. Shemyakin Institute of Molecular Biology, Moscow V.I. Tanyashin Inst. of Biochem- and Physiology of Microorg., Moscow	P. Wensink Brandeis U., Waltham, Mass. R. Schleif Brandeis U., Waltham, Mass.	3 years 1976	Coordinated research projects on selected model systems	Improved development of selective microbial systems for genetic engineering

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TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
1. (Continued)						
1.7 (Continued)		M.I. Matvienko Inst. of Biochem. and Physiology of Microorgan., Pouschino				

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WORKING PROGRAM

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PROJECT COORDINATORS Dr. Halvorson and Dr. Brown, USA and Dr. S. Alikhanian, USSR

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
2	Development of methods for genetic analysis for insect control					
2.1	Workshop and development of research projects	E. Afrikian Inst. Microbiol Ahovian, Armenia I.A. Zakharov Kostantinov Inst. of Nuclear Physics, Leningrad I. Domaradsky Extrachromosome Genetic Lab., Moscow	P. Gerhardt Mich. State U., E. Lansing, Mich.	3 days Oct. 1974	Workshop in connection with spores VII. E. Lansing, Mich. 5 USSR Partici. 20 USA partici.	Research project design Exchange of information
2.2	Physiology and genetics of insect pathogens	M.G. Oganesian Inst. of Genetics & Selection of Industrial Microorgan., Armenia Branch V.V. Sukhodolets Inst. Genetics & Selection of Industrial Microorgan., Moscow	G. St. Julian USDA Peoria, Ill. R. Hansen U.of Wisc., Madison	3 days 1975	Conference in Armenia 5 USA partici. 8 USSR partici.	Planning of research programs

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WORKING PROGRAM

PROJECT NO. 3 PROJECT TITLE Genetics of Industrial Microorganisms

PROJECT COORDINATORS Dr. Halvorson and Dr. Brown, USA and Dr. S. Alikhanian, USSR

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
2 (Continued)						
2.3	Improved development of insect pathogens participants to be determined by 2.2			3 years 1976-9	Cooperative research support Exchange of post-doctoral fellows	Strain and yield improvement
2.4	Physiology and genetics of Bacillus thuringiensis and Bacillus popilliae					
		E. Afrikian Inst. Microbio. Ahovian, Armenia	L. Bulla USDA Grain Marketing Research Center, Manhatan, Kansas	1 year 1975-6	Postdoctoral or senior scientist exchange	Improved toxin production

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TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
3	Development of genetic methods to improve industrial strains of yeasts, including utilization of hydrocarbons, methanol, etc.					
3.1	Conference on mutagenesis and recombination in yeasts	S.G. Inge-Vechtomov Dept. Genetics, Leningrad U.	R. Mortimer U. Calif., Berkeley	4-5 days 1975	Conference Leningrad 5 USA 10 USSR	Theory of mutagenesis as applied to strain selection
3.2	Selection of hydrocarbon utilization yeasts	S.G. Inge-Vechtomov Dept. Genetics, Lenigrad U.	R. Mortimer U. of Calif. Berkeley	3 years 1975-8	Research support postdoctoral exchange	Improved production of hydrocarbon utilizing yeasts
3.3	Improved methods for genetic analysis in yeasts	B.V. Simmon Dept. Genetics Leningrad U.	D. Halvorson Brandeis U., Waltham, Mass.	3 years 1975-8	Research support Postdoctoral exchange	Improved theory and methods for meiosis and sporulation

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WORKING PROGRAM

PROJECT NO. 3 PROJECT TITLE Genetics of Industrial Microorganisms

PROJECT COORDINATORS Dr. Halvorson and Dr. Brown, USA and Dr. S. Alikhanian, USSR

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
4	Development of methods of genetic analysis of microorganisms for the production of amino acids					
4.1	Construction of genetic strains for amino acid production	M.G. Oganesian, Inst. of Genetics & Selection of Ind. Microorgan., Armenia Branch N.I. Zhdanova, same, Moscow	J. Shapiro, U. of Chicago. Chicago, Ill.	3 years 1974-77	Cooperative research support Postdoctoral exchange	Improved strain development
4.2	Development of viruses systems for genetic analysis in Bacillus	V.V. Sukhodolets, Inst. Genetics & Select. of Micro-organ., Moscow M.G. Oganesian, Inst. Genetics & Select. of Micro-organ., Armenia	H. O. Halvorson, Brandeis U. Waltham, Mass. F. Young, Rochester Medical School, Rochester, N.Y.	3 years 1974-5	Joint research projects. Exchange of personnel	Improved genetic system
4.3	Symposium on Genetic Methods	Summary of projects 1-4		1 week 1979	Final reports projects	Publish book on conference

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WORKING PROGRAM

PROJECT NO. 4 PROJECT TITLE Enzyme Applications

PROJECT COORDINATOR G.T. Tsao (U.S.A.)

I. Berezin and K. Kalunyante (U.S.S.R.)

TASK NUMBER	TASK OR SUBTASK	AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
1	Search and isolation of enzyme producing strains of microorganisms and tissue cultures					
	1.1 Strain selction	Moscow State Univ. Inst. for Protein Syn. Inst. for Chem. of Natural Prod. Tollin Poly. Inst.	N.S.F. Grantees	5 yrs.	exchange and testing to compare strains	more productiv strains
	1.2 Microbial Physiology	same	same	5 yrs.	joint research projects	more productiv strains
2	Commercial isolation and purification of enzymes					
	2.1 Enzyme isolation	same	same	5 yrs.	joint research projects	processes and equipment for enzym production
	2.2 Process development	same	same	5 yrs.	joint research projects	
	2.3 Stabilization of enzymes	same	same	5 yrs.	joint projects	
	2.4 Equipment design	same	same	5 yrs.	joint projects	

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WORKING PROGRAMS

PROJECT NO. 4 PROJECT TITLE Enzyme Applications

PROJECT COORDINATOR G.T. Tsao, I. Berezin & K.A. Kalunyante

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
3	Immobilized Enzymes					
	3.1 Theoretical analysis and modelling	Moscow Univ.	N.S.F. Grantees	5 yrs.	joint projects	development and understanding of new industrial processes
	3.2 Carrier selection	several institutions	same	5 yrs.	joint projects	
	3.3 Multienzyme and/or cofactor systems	same	same	5 yrs.	joint projects	
4	Diagnostic and Analytical Uses of Immobilized Enzymes					
	4.1 Enzyme-immune essay		NSF Grantees	5 yrs.	joint projects	new diagnostic techniques
	4.2 Enzyme detection of faint light or sound	Moscow Univ. Berrain	Univ. of Penn. Graves Others	5 yrs.	joint projects	

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WORKING PROGRAMS

PROJECT NO. 4 PROJECT TITLE Enzyme Applications

PROJECT COORDINATOR G.T. Tsao, I. Berezin & K.A. Kalunyante

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
	Technology of Enzymatic Cleavages					
	5.1 Production of sugar from cellulose	L.S. Losyakova Inst. of Biosyn. of Protein Sub.	Wilke and Bassham U. Cal. Berkeley	5 yrs.	joint project	USE OF ENZYMES IN AGRICULTURE
	5.2 Fermentable sugars from agricultural wastes	L.S. Losyakova	Burnet and Lee	5 yrs.	joint project	
	5.3 Enzyme production of milk substitutes			5 yrs.	joint project	
	5.4 Cleavage reversal to make peptides and fine chemicals	same	Corning Glass Weetal	5 yrs.	joint project	
	Participation in Polymery 74 Conference Symposium on Production and Properties of Immobilized Enzymes	Berrezin	Tsao			

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WORKING PROGRAM

PROJECT NO. 5 PROJECT TITLE Microbiolgoical Control of Pests of Agricultural Crops

PROJECT COORDINATORS Dr. A. Heimpel, USDA, USA and Dr. Olga A. Alioshina

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
	Sporulation of Milky Disease Bacteria					
1	Exchange of publication & bacterial cultures	N. Acad. Armenian, USSR, Kiev, Moscow	Cornell Exp. St. Geneva, N.Y. ARS, Beltsville, Md.	Start 7/74 continual exchange	Exchange of cultures and literature	Establish virulent strains for further work
2	Working planning meetings on problems 2 & 3	"	" + other participants (3 days)	Late Fall 1974	Meeting in US 6-7 US 6-7 USSR	Plan cooperative program
3	Research on survey & basic	"	"	January 1975-1976	Cooperative Research, Correspondence	Partial sporulation possibly successful method
4	Second work planning meeting on problems	"	"	Spring 1977	Meeting in USSR 8-10 US 8-10 USSR	Plan future program
5	Final meeting to prepare report	"	All previous participants (4 days)	Early Spring 1978	Meeting in US	Prepare final report

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WORKING PROGRAM

PROJECT NO. 5 PROJECT TITLE Microbiological Control of Pests of Agricultural Crops

PROJECT COORDINATORS Dr. A. Heimpel, USDA, USA and Dr. Olga A. Alioshina

TASK NUMBER	NAME OF TASK OR SUB-TASK	NAME OF PARTICIPANTS AND COOPERATING INSTITUTIONS U.S.S.R.	U.S.	DATE AND DURATION OF TASK	FORMS OF COOPERATION	EXPECTED RESULTS
	Production of Viruses					
2.1	Exchange of cell lines & publications		Ohio State Univ. ARS, Beltsville, Md. & Phoenix, Ariz.	Start 7/74 continual	Material & literature	Prepare for cooperative
2.2	Work planning meeting on problems on 2, 3, & 4		"	Early Fall 1974	Meeting in USSR 6-7 US 6-7 USSR	Plan of cooperative program
2.3	Research on problems 2, 3, & 4		"	1974-1976	Cooperative research	Method for virus production and storage
2.4	Final meeting		"	June 1976	Meeting in U.S., all participants	Final report

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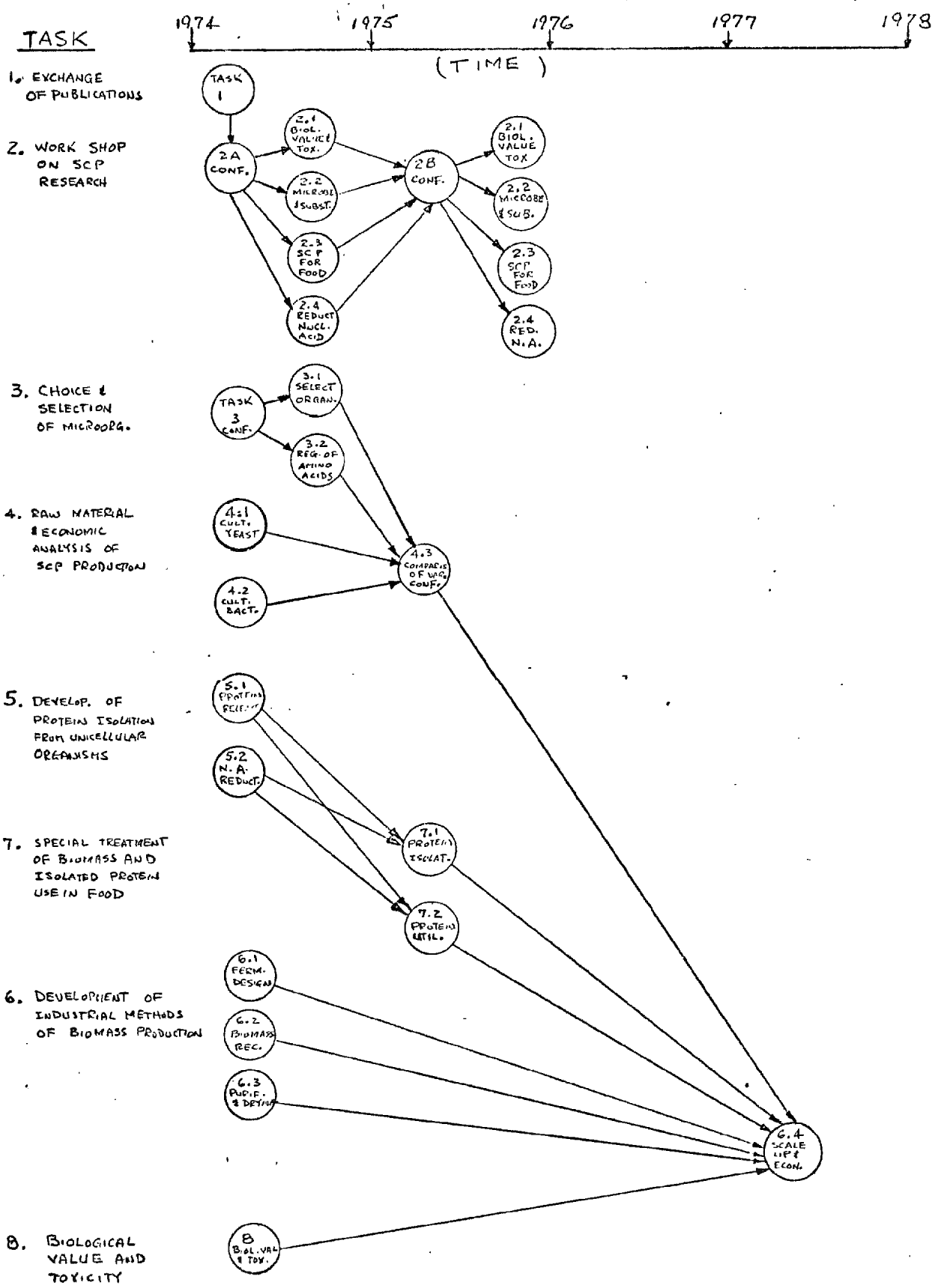
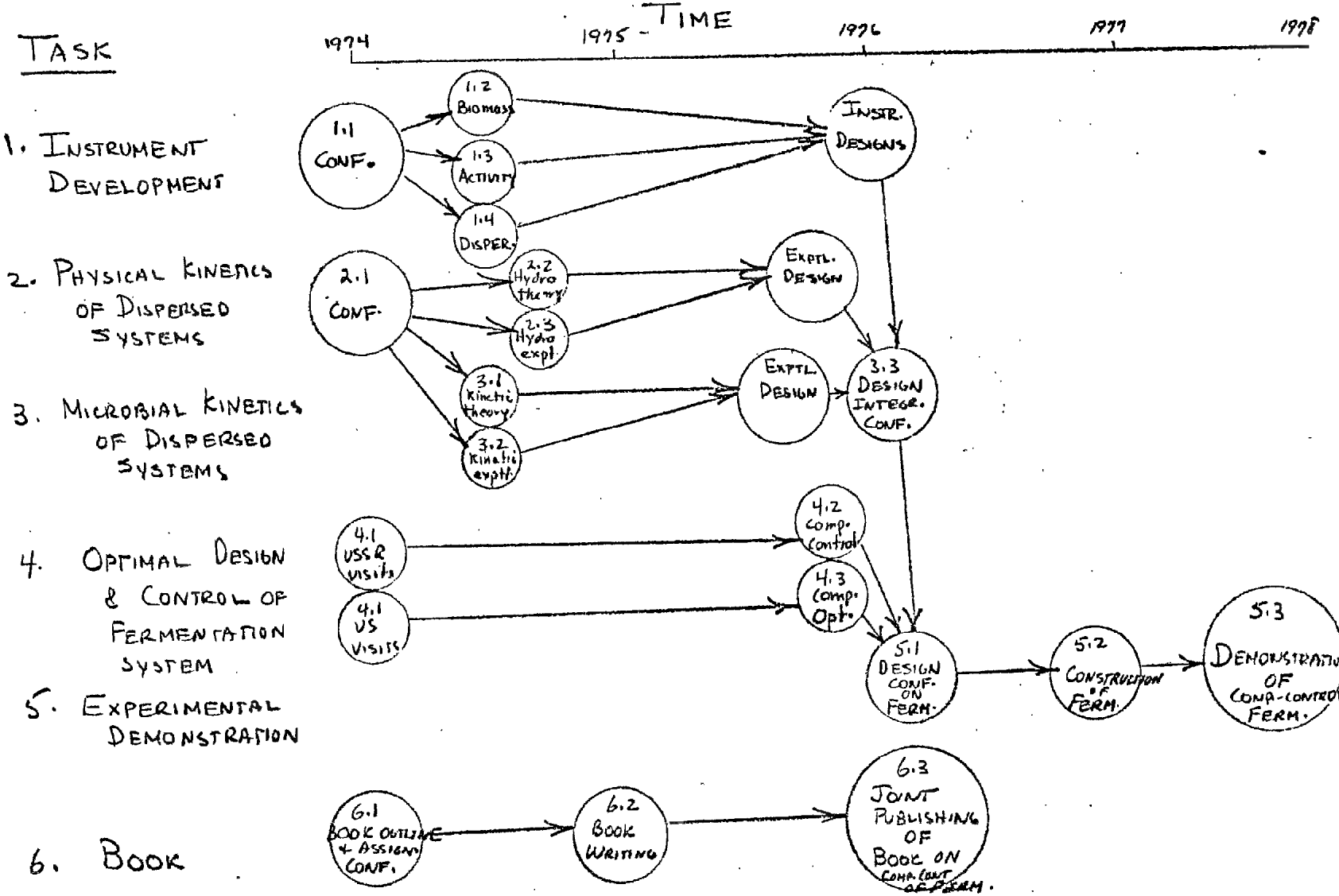
MILESTONE PROJECT NO. 1 : DEVELOPMENT OF TECHNOLOGY FOR INDUSTRIAL PRODUCTION OF PROTEINS BY MICROBIAL MEANS (PREPARED BY D.I.C. WANG, 2/13/74)



PROJECT 2

COMPUTER SIMULATION, DESIGN & CONTROL



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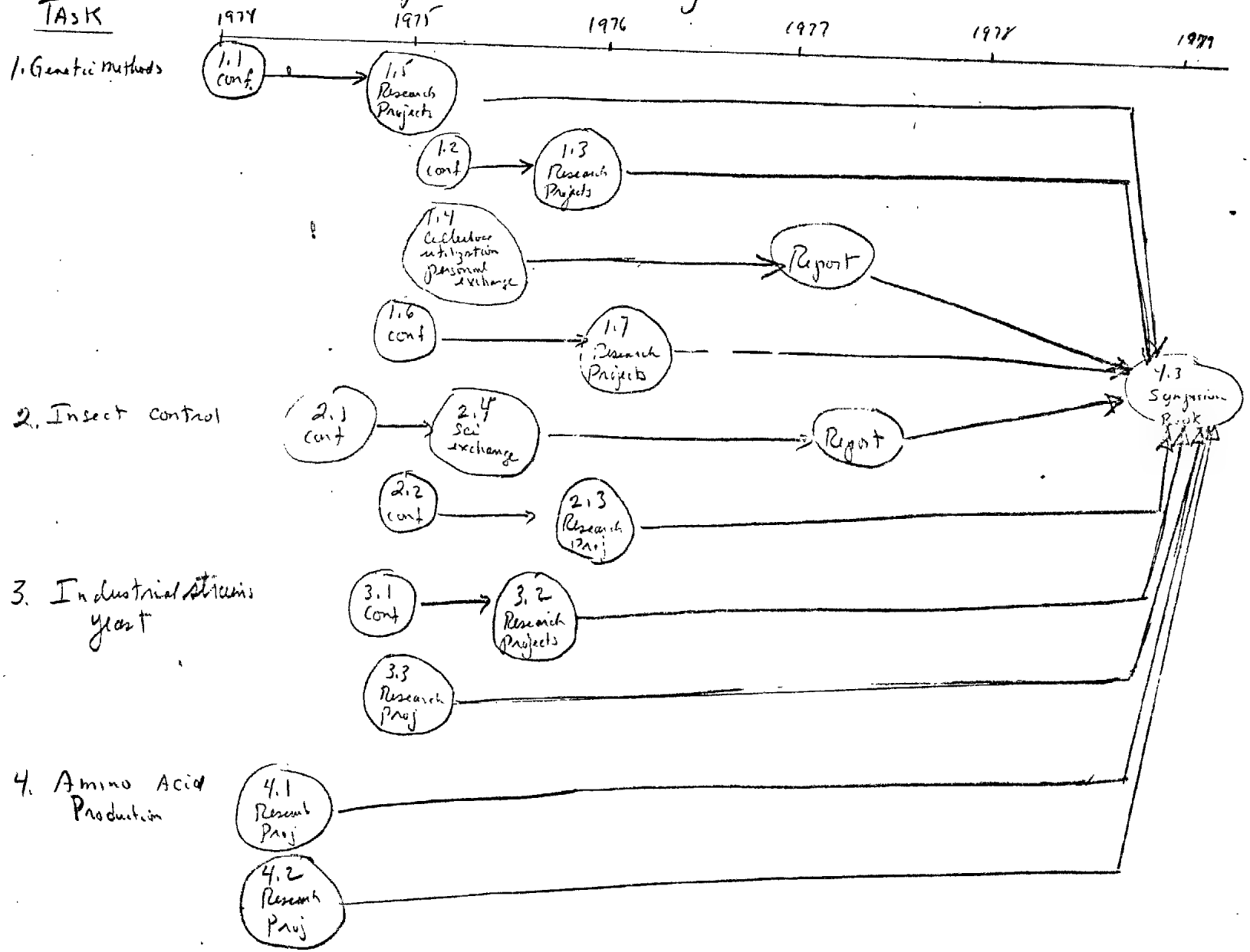
Project 3

Genetics of Industrial Microorganisms



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Project 1

TOTAL BUDGET ESTIMATE
FIVE YEARS WITH PRIORITY

Development of Technology for Industrial Production and Utilization of Food and Feed Proteins by Microbial Means, Including Research Into Different Aspects of Toxicity and Biological Value

Task Number	Type of Task	Starting Date	Duration of Task	First Priority Estimated Budget ($)	Second Priority Estimated Budget ($)	Third Priority Estimated Budget ($)
1	Clerical	July, 1974	5 Years	$500	$2000	$2000
2A	Conference	July, 1974	3 Days	$5000	$9000	$9000
2B	Conference	Sept., 1974	3 Days	--	$9000	$9000
3.2	Conference	Sept., 1974	1 Day	$1000	$1000	$1000
4.1	Res. & Dev.	July, 1974	2 to 3 Years	$50,000	$110,000	$250,000
4.2	Res. & Dev.	July, 1974	2 to 3 Years	$50,000	$110,000	$250,000
4.3	Conference	Sept., 1975	1 Week	--	$2000	$2000
5.1	Res. & Dev.	July, 1974	2 to 3 Years	$30,000	$80,000	$160,000
5.2	Res. & Dev.	July, 1974	2 to 3 Years	$30,000	$80,000	$120,000
6.1	Res. & Dev.	July, 1974	2 to 4 Years	$50,000	$100,000	$250,000
6.2	Res. & Dev.	July, 1974	2 to 3 Years	--	$80,000	$100,000
6.3	Res. & Dev.	July, 1974	2 to 3 Years	--	$100,000	$200,000
6.4	Workshop	Sept., 1974	2 Months	--	$20,000	$35,000
7.1	Res. & Dev.	July, 1975	2 to 3 Years	--	$80,000	$80,000
7.2	Res. & Dev.	July, 1975	2 to 3 Years	--	$80,000	$80,000
8	Res. & Dev.	July, 1974	3 to 5 Years	$40,000	$150,000	$450,000
TOTAL FOR FIVE YEARS				$256,500 (1st Priority)	$1,013,000 (2nd Priority)	$1,998,000 (3rd Priority)

BUDGET TIMING OVER FIVE YEARS

Project No. 1

FIRST PRIORITY

Task No.	1st Year	2nd Year	3rd Year	4th Year	5th Year	Subtotal for 5 Years
1	$500	0	0	0	0	$500
2A	$5000	0	0	0	0	$5000
2B	0	0	0	0	0	0
3.2	1000	-	-	-	-	$1000
4.1	25,000	25,000	-	-	-	50,000
4.2	25,000	25,000	-	-	-	50,000
5.1	20,000	10,000	-	-	-	30,000
5.2	20,000	10,000	-	-	-	30,000
6.1	30,000	20,000	-	-	-	50,000
6.2	-	-	-	-	-	0
6.3	-	-	-	-	-	0
6.4	-	-	-	-	-	0
7.1	-	-	-	-	-	0
7.2	-	-	-	-	-	0
8	20,000	20,000	-	-	-	40,000
Total	$146,500	$110,000	0	0	0	$256,500

BUDGET TIMING OVER FIVE YEARS

Project No. 1

SECOND PRIORITY

Task No.	1st Year	2nd Year	3rd Year	4th Year	5th Year	Subtotal for 5 Years
1	$1000	$500	$500	-	-	$2000
2A	$9000	-	-	-	-	$9000
2B	-	$9000	-	-	-	$9000
3.2	$1000	-	-	-	-	$1000
4.1	$55,000	$55,000	-	-	-	$110,000
4.2	$55,000	$55,000	-	-	-	$110,000
4.3	-	$2000	-	-	-	$2000
5.1	$35,000	$45,000	-	-	-	$80,000
5.2	$30,000	$50,000	-	-	-	$80,000
6.1	$45,000	$55,000	-	-	-	$100,000
6.2	$40,000	$40,000	-	-	-	$80,000
6.3	$45,000	$55,000	-	-	-	$100,000
6.4	-	-	$20,000	-	-	$20,000
7.1	-	$40,000	$40,000	-	-	$80,000
7.2	-	$40,000	$40,000	-	-	$80,000
8	$50,000	$50,000	$50,000	-	-	$150,000
Total	$366,000	$496,500	$155,500	-	-	$1,013,000

BUDGET TIMING OVER FIVE YEARS

Project No. 1

THIRD PRIORITY

Task No.	1st Year	2nd Year	3rd Year	4th Year	5th Year	Subtotal for 5 Years
1	$1000	$500	$500	–	–	$2000
2A	$9000	–	–	–	–	$9000
2B	–	$9000	–	–	–	$9000
3.2	$1000	–	–	–	–	$1000
4.1	$100,000	$100,000	$50,000	–	–	$250,000
4.2	$100,000	$100,000	$50,000	–	–	$250,000
4.3	–	$2000	–	–	–	$2000
5.1	$60,000	$70,000	$30,000	–	–	$160,000
5.2	$40,000	$50,000	$30,000	–	–	$120,000
6.1	$50,000	$60,000	$150,000	–	–	$250,000
6.2	$40,000	$50,000	$10,000	–	–	$100,000
6.3	$80,000	$80,000	$40,000	–	–	$200,000
6.4	–	–	$35,000	–	–	$35,000
7.1	–	$40,000	$40,000	–	–	$80,000
7.2	–	$40,000	$40,000	–	–	$80,000
8	$50,000	$70,000	$110,000	$110,000	$120,000	$450,000
Total	$531,000	$671,500	$565,500	$110,000	$120,000	$1,998,000

TOTAL BUDGET ESTIMATE
FIVE YEAR PLANNING FOR
PROJECT NO. 2

"Engineering Research and Development of Equipment and Methods for the Computerized Simulation, Design and Control of Processes for Microbial Technology"

Project Coordinators: Dr. Shamil Yenikeyev
Dr. Arthur E. Humphrey

Task No.	Type of Task	Starting Date	Duration	1st Priority	2nd Priority	3rd Priority
1.1	Conference	July 1974	1 week	10,000		
1.2	Research	July 1974	2 yrs.	130,000		
1.3	Research	July 1974	2 yrs.			
1.4	Research	July 1974	2 yrs.	USSR		
2.1	Conference	Sept. 1974	1 week	5,000		
2.2	Research	Jan. 1974	2 yrs.		65,000	
2.3	Research	Jan. 1974	2 yrs.	USSR		
3.1	Research	Jan. 1974	2 yrs.		65,000	
3.2	Research	Jan. 1974	2 yrs.	USSR		
3.3	Conference	July 1976	1 mo.	10,000		
4.1	2 Exchange Visits	1975-1976	1 yr.		24,000	
4.2	Research	July 1974	2 yrs.	180,000		180,000
4.3	Research	July 1974	2 yrs.		180,000	180,000
5.1	Conference	Fall 1976	2 weeks	10,000		
5.2	Research (consultation)	July 1976	1 yr.	USSR	5,000	
5.3	Consultation	Summer 1977	3 mos.	USSR	10,000	
6.1	Conference	Fall 1974	2 weeks			10,000
6.2	Conference & Consultation	Fall 1974	2 yrs.			50,000
6.3	Consultation & Publishing	Summer 1976	3 mos.			10,000
				345,000.	349,000.	430,000.
		CUMULATIVE TOTALS		345,000.	694,000.	1,124,000.

PROJECT 3

A - Low Budget
B - Modest Budget
C - Full Budget

VENT	EVENT NAME	ESTIMATED COST[1]	PRIORITIES HOH	PRIORITIES WB
1	3rd Meeting Working Group	----	----	----
2	Conference	$7,000	A	
3	Conference	$6,000	A	
4	Research Projects	30,000 $75,000-$150,000	A Third B ~~Lower~~ C Higher } per Dr. Brown	
5	Research Projects	$40,000	B	
6	Annual Conference	$15,000	C	
7	Research Projects	$75,000-$150,000	A Lower C Higher	
8	Exchange Personnel	$75,000	B	
9	Conference	$7,000	B	
10	Research Projects	$75,000-$150,000	B Lower C Higher	
11	Workshop	$7,000	A	
12	Conference	$5,000	B	
13	Research Projects	$75,000-$150,000	B Lower C Higher	
14	Research Projects	$20,000	C	
15	Conference	$5,000	C	
16	Conference	$5,000	B	
17	Research Projects	$25,000-$50,000 ?	B C. Higher	
18	Research Projects	$50,000-$100,000	A Lower C Higher	
19	Exchange Personnel	$40,000	B	
20	Conference	$4,000	C	
21	Research Projects	$25,000-$50,000	A Lower B Higher	
22	Research Projects	$50,000-$100,000	A Lower C Higher	
23	Exchange Personnel	$40,000	B	
24	Conference	$4,000	C	
25	Symposium	$30,000	A	

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Cable: ERSQUIBB NYK

February 26, 1974

Dr. J. M. Leise
Senior Staff Associate
to the Deputy Assistant
Director for Research
National Science Foundation
Washington, D.C. 20550

Dear Josh:

I have reviewed the priorities set by Harlyn Halvorson on the various events under Project 3 and am in complete accord with the ratings that he has established with one exception. Under event 4, I recommend we set 3 levels of operation for the three possible budgets: A - $30,000, B - $75,000, and C-$150,000. I trust that you will notify us at an early date at what budgetary level we can expect to proceed.

With best wishes,

Sincerely yours,

Bill

William E. Brown

cc: Professor H. O. Halvorson
Dean A. E. Humphrey ✓

PROJECT NO. 4 BUDGET PLAN

FISCAL YEAR

PROJECTS	1974	1975	1976	1977	1978
(1) Polymery 74 Project 4, Task 6	$10,000				
(2) Fermentable sugar Iowa State Project 4, Task 5.2	$80,000	100,00	120,000	140,000	160,000
(3) Sugar from cellulose U. Cal. Berkeley Project 4, Task 5.1	$80,000	100,000	120,000	140,000	160,000
(4) Acoustic Imaging Project 4, Task 4.2	$60,000	80,000	100,000	120,000	140,000
First Priority Group	$230,000	280K	340K	400K	460K
(5) Cleavage Reversal Corning Glass Project 4, Task 5.4	$90,000	100K	110K	120K	130K
(6) Project 4, Task 5.3	------	80K	100K	120K	140K

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3/25/74

U.S.-U.S.S.R. Joint Commission on Scientific and Technical Cooperation

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3/25/74

3/15/74

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Scientific and Technical Cooperation

U.S. WORKING GROUP ON MICROBIOLOGY

U.S. Project Coordinators

Chairman

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NASCF UR
Western Union:
89-2438 NATSCIFOUN

Project Coordinators

1. Development of Technology for Industrial Production of Food and Feed Proteins by Microbial Means

   Dr. Daniel I. C. Wang
   Department of Nutrition and
   Food Science
   Massachusetts Institute of Technology
   Cambridge, Massachusetts 02139

   617-253/2126

2. Engineering Research and Development of Instrumentation and Methods for the Computerized Simulation, Design and Control of Processes for Microbial Technology

   Dr. Arthur E. Humphrey
   Dean, The College of Engineering
   and Applied Science
   University of Pennsylvania
   107 Towne Building
   Philadelphia, Pennsylvania 19174

   215-594/7084

Where available, telex or TWX service identified; otherwise only office telephone numbers listed.

3. Molecular Biology of Industrial Microorganisms

Dr. Harlyn O. Halvorson
Professor of Molecular Biology
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Waltham, Massachusetts 02154

617-647/2431

4. Development of Methods of Producing and Using Enzymes and Other Biologically Active Substances for Agriculture

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Technology Applications
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202-632/0648

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5. Microbiological Control of Pests of Agricultural Crops

Dr. Arthur N. Heimpel
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301-344/2380

3/15/74

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